Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently amended) A gain medium comprising:

a concentrated solid including a plurality of semiconductor nanocrystals, the plurality of semiconductor nanocrystals being close-packed and having an rms deviation in diameter of less than 15%, wherein the concentrated solid is substantially free of defects.

2. (Original) The gain medium of claim 1, wherein the solid includes greater than 0.2% by volume of semiconductor nanocrystals.

3. (Original) The gain medium of claim 1, wherein the solid includes greater than 10% by volume of semiconductor nanocrystals.

4. (Original) The gain medium of claim 1, wherein each of the plurality of semiconductor nanocrystals includes a same or different first semiconductor material selected from the group consisting of a Group II-VI compound, a Group II-V compound, a Group III-VI compound, a Group III-V compound, a Group IV-VI compound, a Group I-III-VI compound, a Group II-IV-VI compound, and a Group II-IV-V compound.

5. (Original) The gain medium of claim 4, wherein each first semiconductor material is selected from the group consisting of ZnS, ZnSe, ZnTe, CdS, CdSe, CdTe, HgS, HgSe, HgTe, AlN, AlP, AlAs, AlSb, GaN, GaP, GaAs, GaSb, GaSe, InN, InP, InAs, InSb, TlN, TlP, TlAs, TlSb, PbS, PbSe, PbTe, and mixtures thereof.

6. (Original) The gain medium of claim 4, wherein each first semiconductor material is overcoated with a second semiconductor material.

7. (Previously presented) The gain medium of claim 6, wherein each second semiconductor material is ZnO, ZnS, ZnSe, ZnTe, CdO, CdS, CdSe, CdTe, MgO, MgS, MgSe,

MgTe, HgO, HgS, HgSe, HgTe, AlN, AlP, AlAs, AlSb, GaN, GaP, GaAs, GaSb, InN, InP, InAs, InSb, TlN, TlP, TlAs, TlSb, TlSb, PbS, PbSe, PbTe, or mixtures thereof.

8. (Original) The gain medium of claim 6, wherein each first semiconductor material has a first band gap and each second semiconductor material has a second band gap that is larger than the first band gap.

9. (Original) The gain medium of claim 1, wherein each nanocrystal has a diameter of less than about 10 nanometers.

10. (Currently amended) The gain medium of claim 1, wherein the rms deviation in diameter is less than 10% ~~plurality of nanocrystals have a monodisperse distribution of sizes~~.

11. (Currently amended) The gain medium of claim 1, further comprising a second plurality of semiconductor nanocrystals ~~wherein the plurality of nanocrystals include a plurality of monodisperse distribution of sizes~~.

12. (Original) The gain medium of claim 1, wherein the concentrated solid of nanocrystals is disposed on a substrate.

13. (Original) The gain medium of claim 12, wherein the substrate is glass and the concentrated solid of nanocrystals has a thickness greater than about 0.2 microns.

14. (Currently amended) A gain medium comprising:

a concentrated solid including a plurality of semiconductor nanocrystals, the plurality of semiconductor nanocrystals being close-packed and having an rms deviation in diameter of less than 15%, wherein the concentrated solid provides gain to an optical signal greater than about 25 (cm^{-1}) when excited by a source and the maximum gain occurs at an energy equal to or less than the maximum band gap emission of the nanocrystals.

15. (Previously presented) The gain medium of claim 14, wherein the concentrated solid provides gain to an optical signal greater than about 50 (cm^{-1}) when excited by a source.

16. (Original) The gain medium of claim 14, wherein each of the plurality of semiconductor nanocrystals includes a same or different first semiconductor material selected from the group consisting of a Group II-VI compound, a Group II-V compound, a Group III-VI compound, a Group III-V compound, a Group IV-VI compound, a Group I-III-VI compound, a Group II-IV-VI compound, and a Group II-IV-V compound.

17. (Original) The gain medium of claim 16, wherein each first semiconductor material is selected from the group consisting of ZnS, ZnSe, ZnTe, CdS, CdSe, CdTe, HgS, HgSe, HgTe, AlN, AlP, AlAs, AlSb, GaN, GaP, GaAs, GaSb, GaSe, InN, InP, InAs, InSb, TlN, TlP, TlAs, TlSb, PbS, PbSe, PbTe, and mixtures thereof.

18. (Original) The gain medium of claim 16, wherein each first semiconductor material is overcoated with a second semiconductor material.

19. (Previously presented) The gain medium of claim 18, wherein each second semiconductor material is ZnO, ZnS, ZnSe, ZnTe, CdO, CdS, CdSe, CdTe, MgO, MgS, MgSe, MgTe, HgO, HgS, HgSe, HgTe, AlN, AlP, AlAs, AlSb, GaN, GaP, GaAs, GaSb, InN, InP, InAs, InSb, TlN, TlP, TlAs, TlSb, TlSb, PbS, PbSe, PbTe, or mixtures thereof.

20. (Original) The gain medium of claim 18, wherein each first semiconductor material has a first band gap and each second semiconductor material has a second band gap that is larger than the first band gap.

21. (Original) The gain medium of claim 14, wherein each nanocrystal has a diameter of less than about 10 nanometers.

22. (Currently amended) The gain medium of claim 14, wherein the rms deviation in diameter is less than 10% ~~plurality of nanocrystals have a monodisperse distribution of sizes~~.

23. (Currently amended) A gain medium comprising:

a concentrated solid including a plurality of semiconductor nanocrystals, the plurality of semiconductor nanocrystals being close-packed and having an rms deviation in diameter of less

than 15%, wherein the concentrated solid provides gain at energies in which a concentrated solid is substantially free of absorption when excited by a source.

24. (Original) The gain medium of claim 23, wherein each of the plurality of semiconductor nanocrystals includes a same or different first semiconductor material selected from the group consisting of a Group II-VI compound, a Group II-V compound, a Group III-VI compound, a Group III-V compound, a Group IV-VI compound, a Group I-III-VI compound, a Group II-IV-VI compound, and a Group II-IV-V compound.

25. (Original) The gain medium of claim 24, wherein each first semiconductor material is selected from the group consisting of ZnS, ZnSe, ZnTe, CdS, CdSe, CdTe, HgS, HgSe, HgTe, AlN, AlP, AlAs, AlSb, GaN, GaP, GaAs, GaSb, GaSe, InN, InP, InAs, InSb, TlN, TlP, TlAs, TlSb, PbS, PbSe, PbTe, and mixtures thereof.

26. (Original) The gain medium of claim 24, wherein each first semiconductor material is overcoated with a second semiconductor material.

27. (Original) The gain medium of claim 26, wherein each first semiconductor material has a first band gap and each second semiconductor material has a second band gap that is larger than the first band gap.

28. (Original) The gain medium of claim 23, each nanocrystal has a diameter of less than about 10 nanometers.

29. (Currently amended) The gain medium of claim 23, wherein the rms deviation in diameter is less than 10% ~~plurality of nanocrystals have a monodisperse distribution of sizes~~.

30. (Previously presented) A laser comprising:

an optical gain medium comprising a concentrated solid including a plurality of semiconductor nanocrystals, the plurality of semiconductor nanocrystals being close-packed; and

a cavity arranged relative to the optical gain medium to provide feedback.

31. (Original) The laser of claim 30, wherein the concentrated solid is substantially free of defects.

32. (Original) The laser of claim 30, further comprising an excitation source.

33. (Original) The laser of claim 32, wherein the excitation source is an optical source.

34. (Original) The laser of claim 33, wherein each of the plurality of semiconductor nanocrystals includes a same or different first semiconductor material selected from the group consisting of a Group II-VI compound, a Group II-V compound, a Group III-VI compound, a Group III-V compound, a Group IV-VI compound, a Group I-III-VI compound, a Group II-IV-VI compound, and a Group II-IV-V compound.

35. (Original) The laser of claim 34, wherein each first semiconductor material is overcoated with a second semiconductor material.

36. (Original) The laser of claim 35, wherein each first semiconductor material has a first band gap and each second semiconductor material has a second band gap that is larger than the first band gap.

37. (Currently amended) The laser of claim 30, wherein the plurality of nanocrystals have <u>an rms deviation in diameter of less than 15%</u> ~~a monodisperse distribution of sizes~~.

38. (Previously presented) A laser comprising:

an optical gain medium comprising a concentrated solid including a plurality of semiconductor nanocrystals, the plurality of semiconductor nanocrystals being close-packed; and

a microcavity arranged relative to the optical gain medium to provide feedback.

39. (Original) The laser of claim 38, wherein each of the plurality of semiconductor nanocrystals includes a same or different first semiconductor material selected from the group consisting of a Group II-VI compound, a Group II-V compound, a Group III-VI compound, a Group III-V compound, a Group IV-VI compound, a Group I-III-VI compound, a Group II-IV-VI compound, and a Group II-IV-V compound.

40. (Previously presented) The laser of claim 39, wherein each first semiconductor material is overcoated with a second semiconductor material.

41. (Original) The laser of claim 40, wherein each first semiconductor material has a first band gap and each second semiconductor material has a second band gap that is larger than the first band gap.

42. (Currently amended) The laser of claim 38, wherein the plurality of nanocrystals have an rms deviation in diameter of less than 15% ~~a monodisperse distribution of sizes~~.

43. (Previously presented) A laser comprising:

an optical gain medium comprising a concentrated solid including a plurality of semiconductor nanocrystals, the plurality of semiconductor nanocrystals being close-packed; and

a cavity arranged relative to the optical gain media to provide feedback, wherein the concentrated solid provides gain to an optical signal at an energy equal to or less than the maximum band gap emission of the nanocrystals.

44. (Original) The laser of claim 43, wherein each of the plurality of semiconductor nanocrystals includes a same or different first semiconductor material selected from the group consisting of a Group II-VI compound, a Group II-V compound, a Group III-VI compound, a Group III-V compound, a Group IV-VI compound, a Group I-III-VI compound, a Group II-IV-VI compound, and a Group II-IV-V compound.

45. (Previously presented) The laser of claim 44, wherein each first semiconductor material is overcoated with a second semiconductor material.

46. (Original) The laser of claim 45, wherein each first semiconductor material has a first band gap and each second semiconductor material has a second band gap that is larger than the first band gap.

47. (Currently amended) The laser of claim 43, wherein the plurality of nanocrystals have an rms deviation in diameter of less than 15% ~~a monodisperse distribution of sizes~~.

48. (Currently amended) A gain medium comprising:

a concentrated solid including a plurality of semiconductor nanocrystals, the plurality of semiconductor nanocrystals being close-packed and having an rms deviation in diameter of less

than 15%, wherein the concentrated solid is substantially free of defects, provides gain to an optical signal at an energy equal to or less than the maximum band gap emission of the nanocrystals, and provides gain at energies in which a concentrated solid is substantially free of absorption when excited by a source.

49. (Currently amended) A method of amplifying an optical signal comprising:

directing an optical beam into a gain medium including a concentrated solid including a plurality of semiconductor nanocrystals, the plurality of semiconductor nanocrystals being close-packed and having an rms deviation in diameter of less than 15%, wherein the concentrated solid is substantially free of defects and provides gain to the optical signal at an energy equal to or less than the maximum band gap emission of the nanocrystals when excited by a source.

50. (Original) The method of claim 49, wherein each of the plurality of semiconductor nanocrystals includes a same or different first semiconductor material selected from the group consisting of a Group II-VI compound, a Group II-V compound, a Group III-VI compound, a Group III-V compound, a Group IV-VI compound, a Group I-III-VI compound, a Group II-IV-VI compound, and a Group II-IV-V compound.

51. (Previously presented) The method of claim 50, wherein each first semiconductor material is overcoated with a second semiconductor material.

52. (Previously presented) The method of claim 51, wherein each first semiconductor material has a first band gap and each second semiconductor material has a second band gap that is larger than the first band gap.

53. (Previously presented) A method of forming a laser comprising:

arranging a cavity relative to an optical gain medium to provide feedback to the optical gain medium, wherein the optical gain medium comprises a concentrated solid including a plurality of semiconductor nanocrystals, the plurality of semiconductor nanocrystals being close-packed.

54. (Original) The method of claim 53, wherein each of the plurality of semiconductor nanocrystals includes a same or different first semiconductor material selected from the group

consisting of a Group II-VI compound, a Group II-V compound, a Group III-VI compound, a Group III-V compound, a Group IV-VI compound, a Group I-III-VI compound, a Group II-IV-VI compound, and a Group II-IV-V compound.

55. (Previously presented) The method of claim 54, wherein each first semiconductor material is overcoated with a second semiconductor material.

56. (Previously presented) The method of claim 54, wherein each first semiconductor material has a first band gap and each second semiconductor material has a second band gap that is larger than the first band gap.

57. (Currently amended) A gain medium comprising a film of close-packed semiconductor nanocrystals having an rms deviation in diameter of less than 15%.

58. (Previously presented) The gain medium of claim 57, wherein the film has a thickness of greater than about 0.2 microns.

59. (Previously presented) The gain medium of claim 57, wherein the gain medium is substantially free of a host material.

60. (Previously presented) The gain medium of claim 57, wherein the film includes greater than 10% by volume semiconductor nanocrystals.

61. (Previously presented) The gain medium of claim 57, wherein each of the semiconductor nanocrystals includes a same or different first semiconductor material selected from the group consisting of a Group II-VI compound, a Group II-V compound, a Group III-VI compound, a Group III-V compound, a Group IV-VI compound, a Group I-III-VI compound, a Group II-IV-VI compound, and a Group II-IV-V compound.

62. (Previously presented) The gain medium of claim 61, wherein each first semiconductor material is selected from the group consisting of ZnS, ZnSe, ZnTe, CdS, CdSe, CdTe, HgS, HgSe, HgTe, AlN, AlP, AlAs, AlSb, GaN, GaP, GaAs, GaSb, GaSe, InN, InP, InAs, InSb, TlN, TlP, TlAs, TlSb, PbS, PbSe, PbTe, and mixtures thereof.

63. (Previously presented) The gain medium of claim 61, wherein each first semiconductor material is overcoated with a second semiconductor material.

64. (Previously presented) The gain medium of claim 63, wherein each second semiconductor material is selected from the group consisting of ZnO, ZnS, ZnSe, ZnTe, CdO, CdS, CdSe, CdTe, MgO, MgS, MgSe, MgTe, HgO, HgS, HgSe, HgTe, AlN, AlP, AlAs, AlSb, GaN, GaP, GaAs, GaSb, InN, InP, InAs, InSb, TlN, TlP, TlAs, TlSb, TlSb, PbS, PbSe, PbTe, and mixtures thereof.

65. (Previously presented) The gain medium of claim 63, wherein each first semiconductor material has a first band gap and each second semiconductor material has a second band gap that is larger than the first band gap.

66. (New) A concentrated solid including a plurality of semiconductor nanocrystals, the plurality of semiconductor nanocrystals having an rms deviation in diameter of less than 15%, wherein the concentrated solid is substantially free of defects.